Software Testing and Quality Assurance

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- Something about this course
  - Academic degree course
  - English&Chinese teaching & learning
  - Some rules: attendance/homework/exercises
  - The references

考勤班长：钟晨瑗　　考勤管理细则

Software Testing and Quality Assurance

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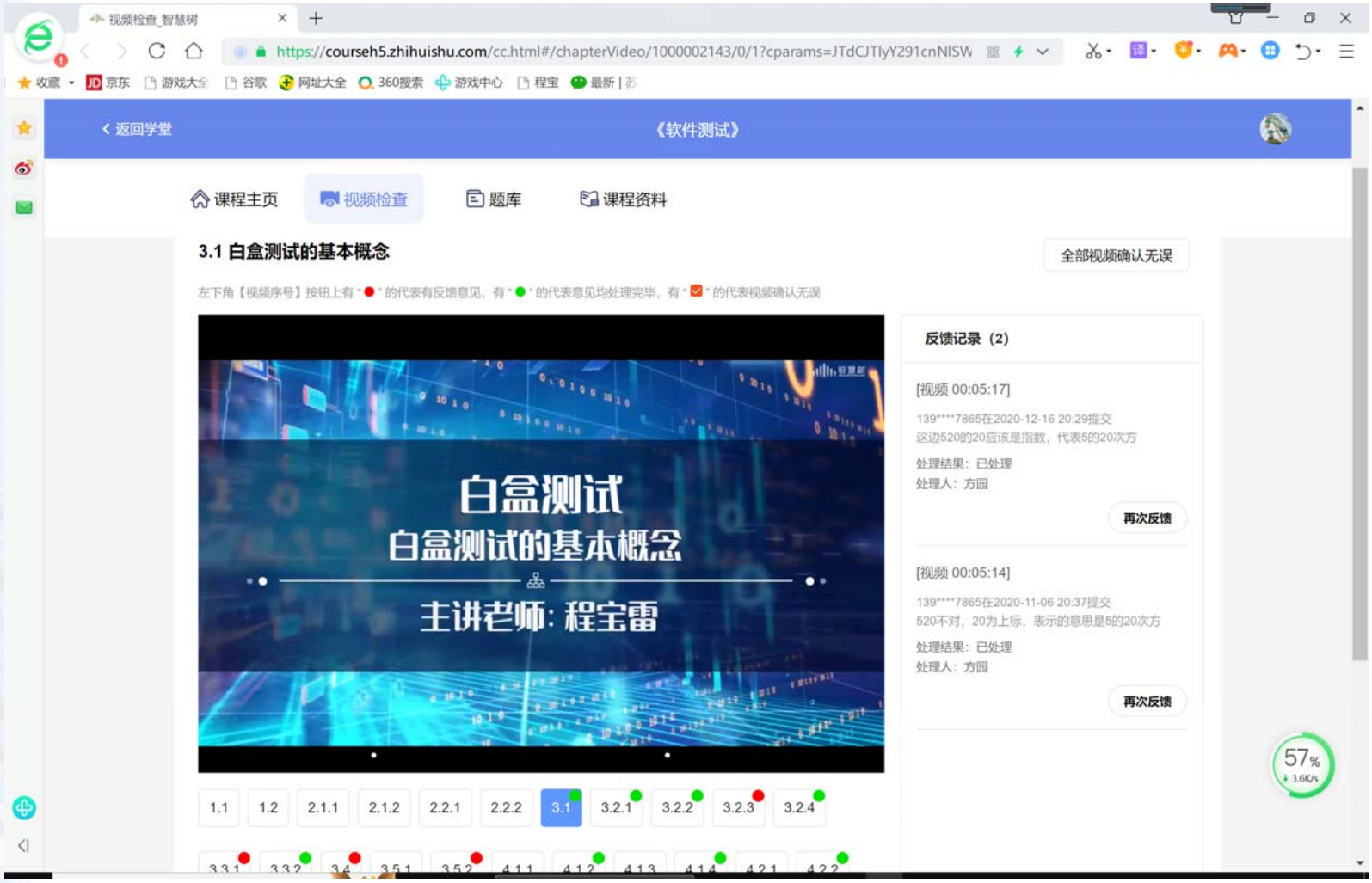
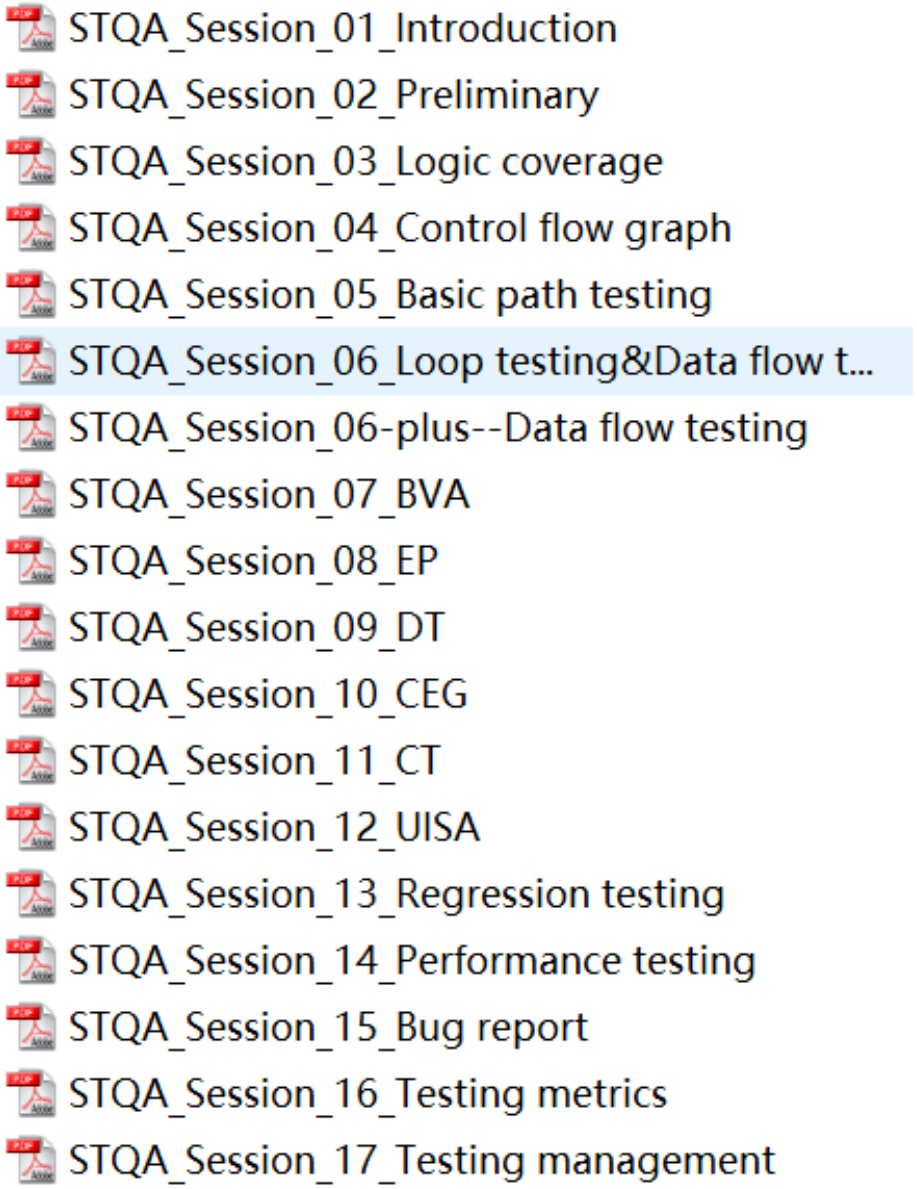


- The contents
  - Introduction of STQA
  - Basic concepts of ST
  - Testing methods: Wh
  - Testing phases: U-I-S
  - Testing report
  - Testing metrics



- Score？
- Course objectives？
  - Application in graduation project
  - Publication of papers

Session 1

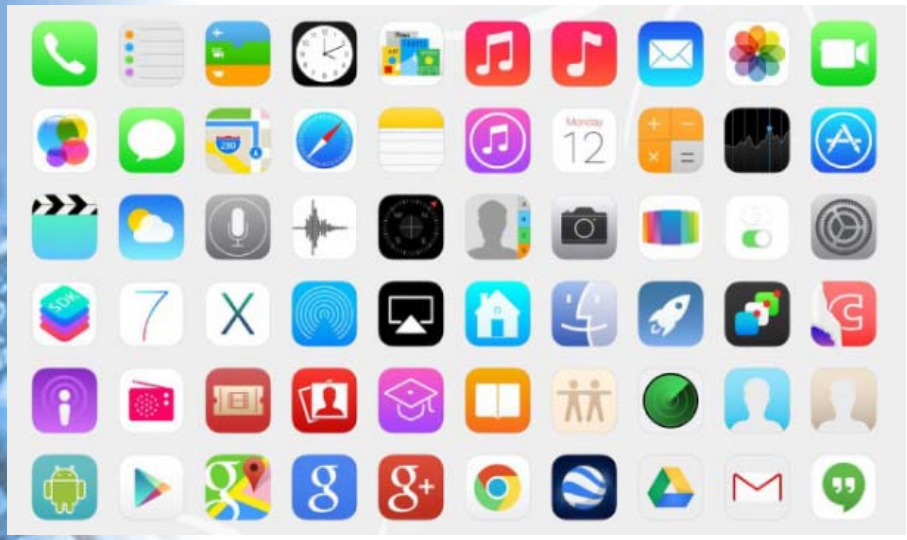
Introduction of Software Quality Assurance and Software Testing

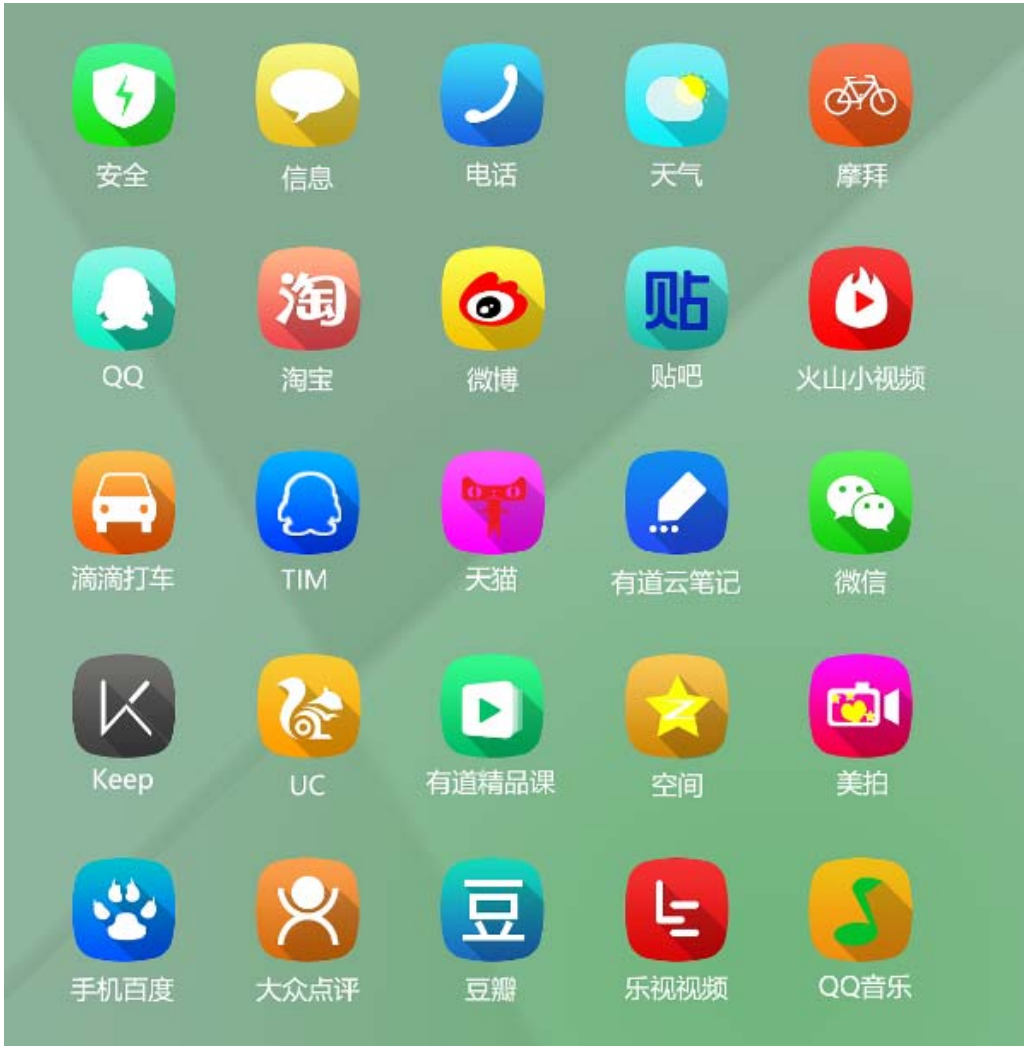
Objectives

- In this session, you will learn:
  - The basic idea of SQA
  - Quality assurance and quality control
  - Testing overview

- Why we need software testing?

- We need software





软件的组成部分有哪些?（　　）

A. 计算机程序

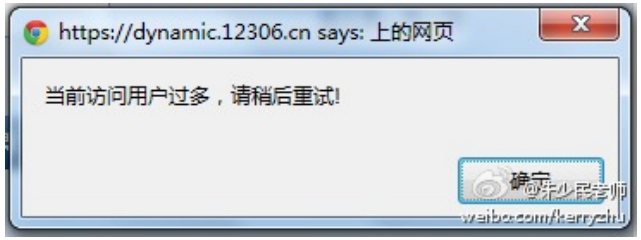
B. 计算机程序和文档

C. 计算机程序和规程

D. 计算机程序、规程以及可能的相关文档和运行计算机系统所需的数据

We need software of good quality

08奥运票务中心、12306的道歉



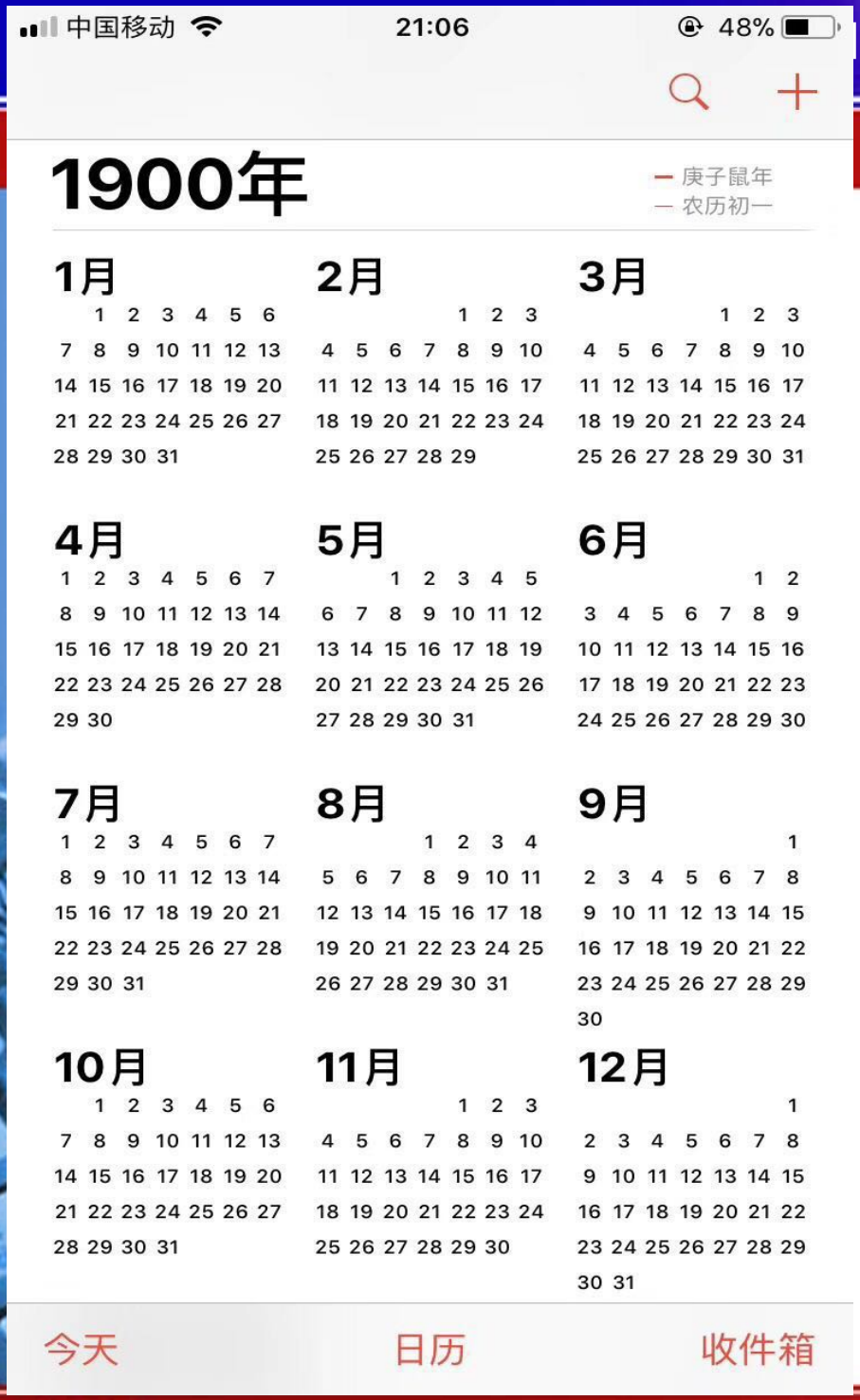
2007年10月30日，北京奥运会第二阶段门票销售刚启动就因为购票者太多而被迫暂停。低估了群众购票的热情，导致售票系统出现了瓶颈问题

一个缺陷造成了数亿美元损失

（4195835 / 3145727）×3145727- 4195835 = ?

最后 **Intel**公司付出很大代价，回收**CPU**，造成**4**亿美元损失

波音737 MAX 软件故障


中国移动
21:06
48%
1900年
庚子鼠年
农历初一
1月
2月
3月
4月
5月
6月
7月
8月
9月
10月
11月
12月
今天
日历
收件箱


晚上7:30
4G
评论：徽商银行
全部
好评(8)
差评(49)
斗登陆不上
我小鱼 11-22 3.3.6版本
不怎么好用
用户31713 11-19 3.3.6版本
真不知道给差评的人是怎么弄的，我用着都挺好，功能都很精致，恶意攻击在秀人品下限还是根本就是人品太差?
吃猪侠 10-08 3.3.5版本
垃圾，转账之后，钱到了，却没有当天的记录，看不放当天的转账记录啊，竟然要延迟2天才有，所有银行也只有徽商银行这样吧。
松林海浪 09-15 3.3.4版本
垃圾，这就是在浪费时间，
月儿 09-14 3.3.4版本
太垃圾
卓寒 07-31 3.3.3版本
评论

- We need some methods to ensure the quality

软件错误

在软件生命周期内不希望或不可接受的人为错误，结果导致软件缺陷的产生

软件缺陷

缺陷存在于软件及相关的文档中，在特定的条件下会使软件产生故障

软件故障

软件处于一种不希望或不可接受的内部状态，不及时处理就会使软件失效

软件失效

软件处于一种不希望或不可接受的外部状态

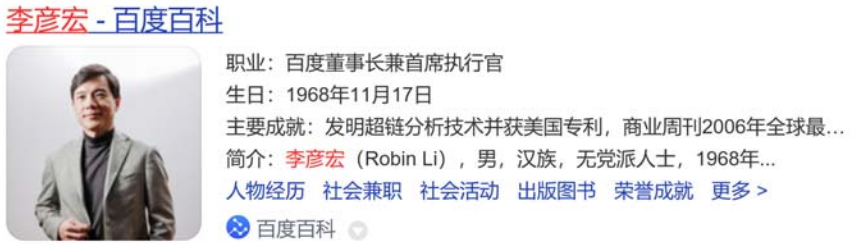
- 软件中存在的缺陷给我们带来的损失是巨大的，这也说明了软件测试的必要性和重要性
- 测试是所有工程学科的基本组成单元，自然也是软件开发的重要组成部分
- 测试人员水平越高，找到软件问题的时间就越早，软件就越容易更正，产品发布之后越稳定，收益越大


Dog and Testing
微信号: QualityReport

- Eating your own dog food，*Dogfooding*
- 自己公司使用自己开发的产品
  - 1988 年，微软的高管 Paul Maritz 在写给测试主管的一封邮件中

故事1:二战期间，美国空军降落伞的合格率为99.9%，这就意味着从概率上来说，每一千个跳伞的士兵中会有一个因为降落伞不合格而丧命。军方要求厂家必须让合格率达到100%才行，厂家负责人说他们竭尽全力了，99.9%已是极限，除非出现奇迹，军方就改变了检查制度，要求厂家负责人亲自跳伞检测。从此，奇迹出现了，降落伞的合格率达到了百分

  都吃一罐自己公司的狗粮。
  - 二战期间降落伞
  - 百度无人车



Fundamentals of Software Quality Assurance

- Quality is defined as the degree of excellence of a software.
- Quality can be interpreted as meeting the following customer requirements:
  - Explicit
    - External: features, usability
  - Implicit
    - Internal: maintainability, user experience

Introducing Software Quality Assurance

- To ensure quality in the software development process, you need to implement software quality assurance activities in each phase of the Software Development Life Cycle (SDLC).
- SQA is a planned and systematic approach for monitoring and improving the software development process.
- SQA processes evaluate the adherence of a software product to software product standards.

Introducing Software Quality Assurance (Contd.)

- SQA Activities in Various Phases of the SDLC:
  - Software conception and initiation
  - Analysis
  - Design
  - Construction
  - Testing

Introducing Software Quality Assurance (Contd.)

- To ensure that the quality assuranceobjectives are met, a project SQA (P11) plan is created.
  - A part of comprehensive project plan
  - Specifies the QA procedure
  - Assigns roles and responsibilities
- Plan-Do-Check-Action

Quality Assurance and Quality Control

- Quality activities can be segmented into two categories:
  - Preventive activities
  - Detective activities

Quality Assurance and Quality Control

- QA is oriented to the prevention of defects rather than their detection and is used to implement the defined quality policy of an organization through the process of development and continuous improvement.

Quality Assurance and Quality Control (Contd.)

- Quality Assurance (QA) activities include:
  - Quality Audit
  - Process definition
  - Tool selection
  - Training
  - Peer review
  - Requirements tracking
  - Quality metrics collection
  - …

Quality Assurance and Quality Control (Contd.)

- Quality Control (QC) is the process by which the quality of a product is compared with specific standards, and action is taken if the quality does not match the applicable standards.
- QC is oriented to detection of defects rather than prevention.

Quality Assurance and Quality Control (Contd.)

- QC activities include:
  - Inspection
  - Testing
  - Checkpoint review
  - …
- QA VS. QC

Testing Overview

- What is testing ?
- Who does testing ?
- When to Start testing ?
- When to Stop testing ?

- 5W+1H

Testing Overview

- What is testing ?

According to ANSI/IEEE 1059 standard, Testing can be defined as

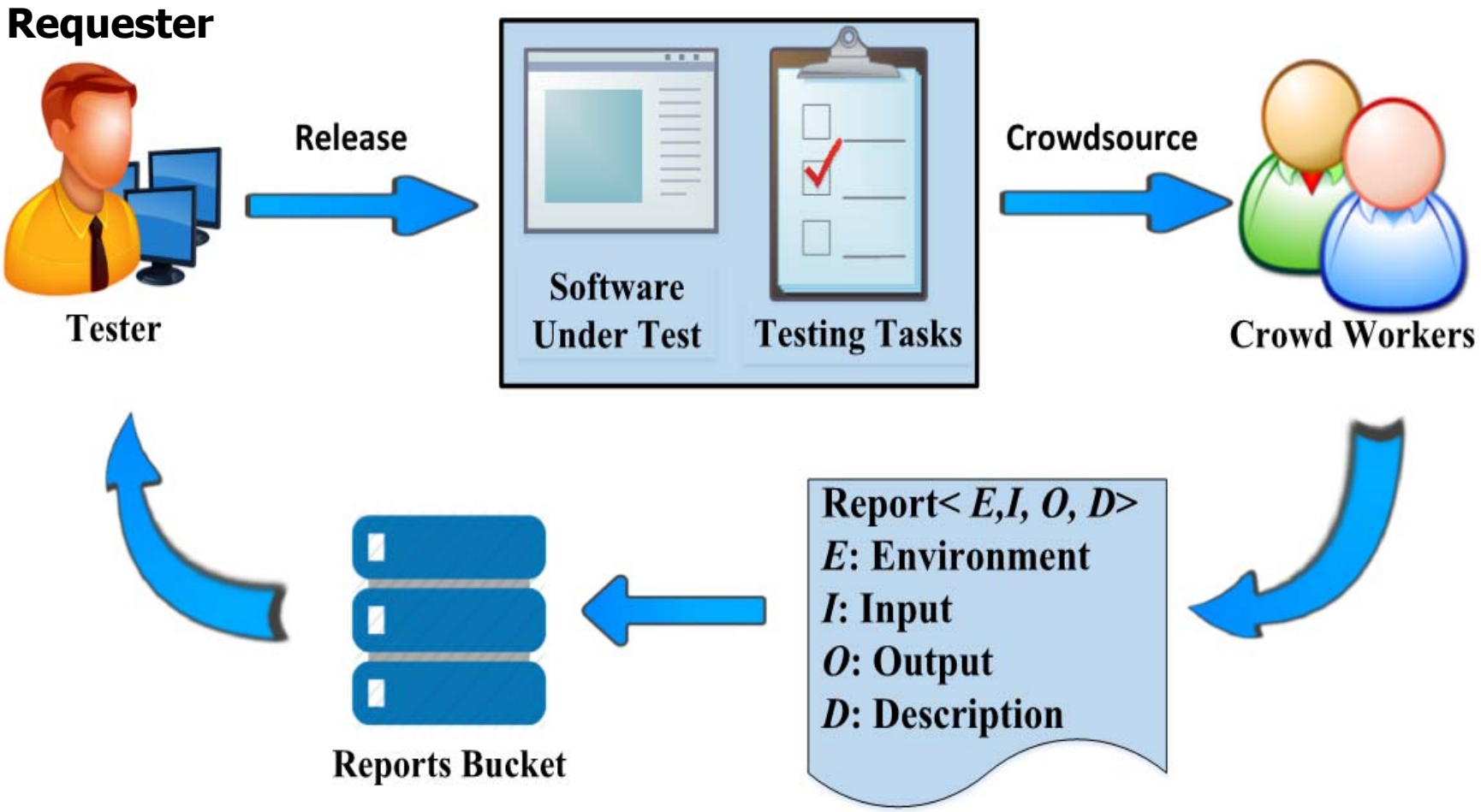
A process of analyzing a software item to detect the differences between existing and required conditions (that is defects/errors/bugs…) and to evaluate the features of the software item.

Testing is everywhere

Testing Overview

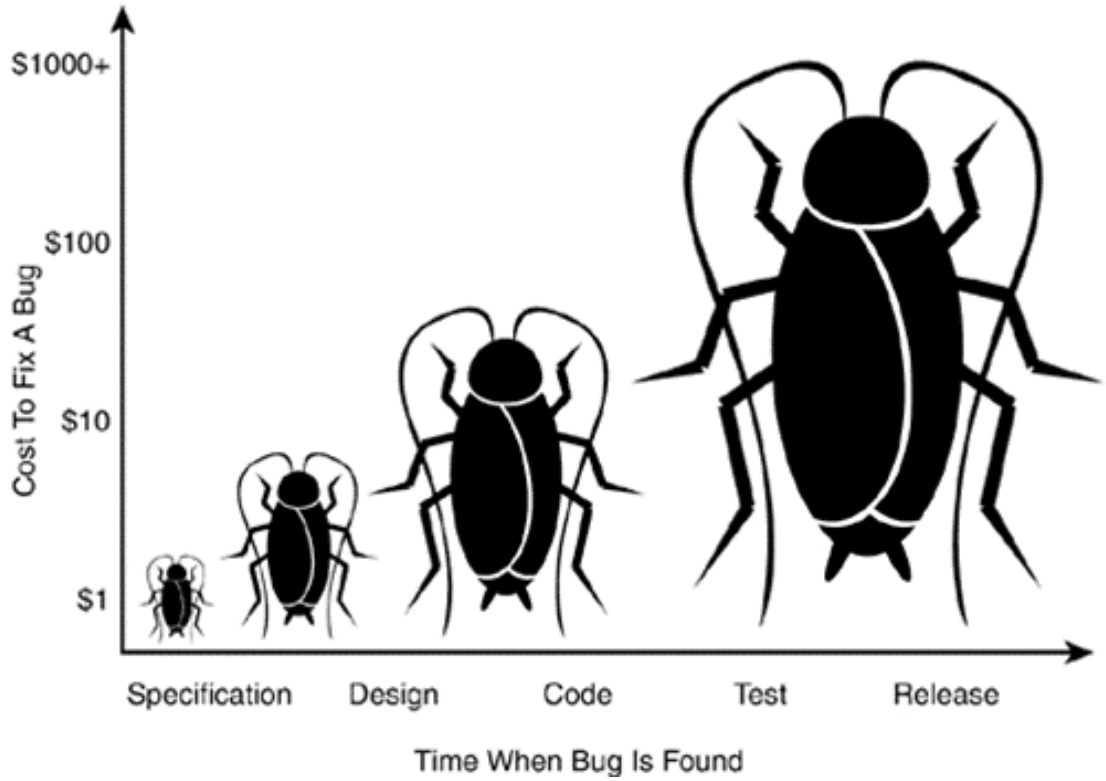
- Who does testing ?
  - Software Tester
  - Software Developer
  - Project Lead/Manager
  - End User
- Crowdsourcing Testing
  - Anyone—crowd worker

Crowdsourcing Testing(众包测试)



Testing Overview

- When to Start Testing ?
  - The earlier, the better



Testing Overview

- When to Start Testing ?
  - The earlier, the better
  - Depends on the development model
    - Waterfall model vs. incremental model
  - Testing is done in different forms at every phase of SDLC

Testing Overview

- When to Stop Testing ?
  - Testing is a never ending process
  - Some aspects

    --Testing Deadlines.

    --Completion of test case execution.

    --Completion of functional and code coverage to a certain point.

    --Bug rate falls below a certain level and no high priority bugs are identified.

    --Management decision.

Summary

- The need of SQA & Testing
- The basic idea of SQA
- Difference between quality assurance and quality control
- Testing overview

- A question:

  Testing is a subset of quality assurance or quality control?